

Fig. 1A

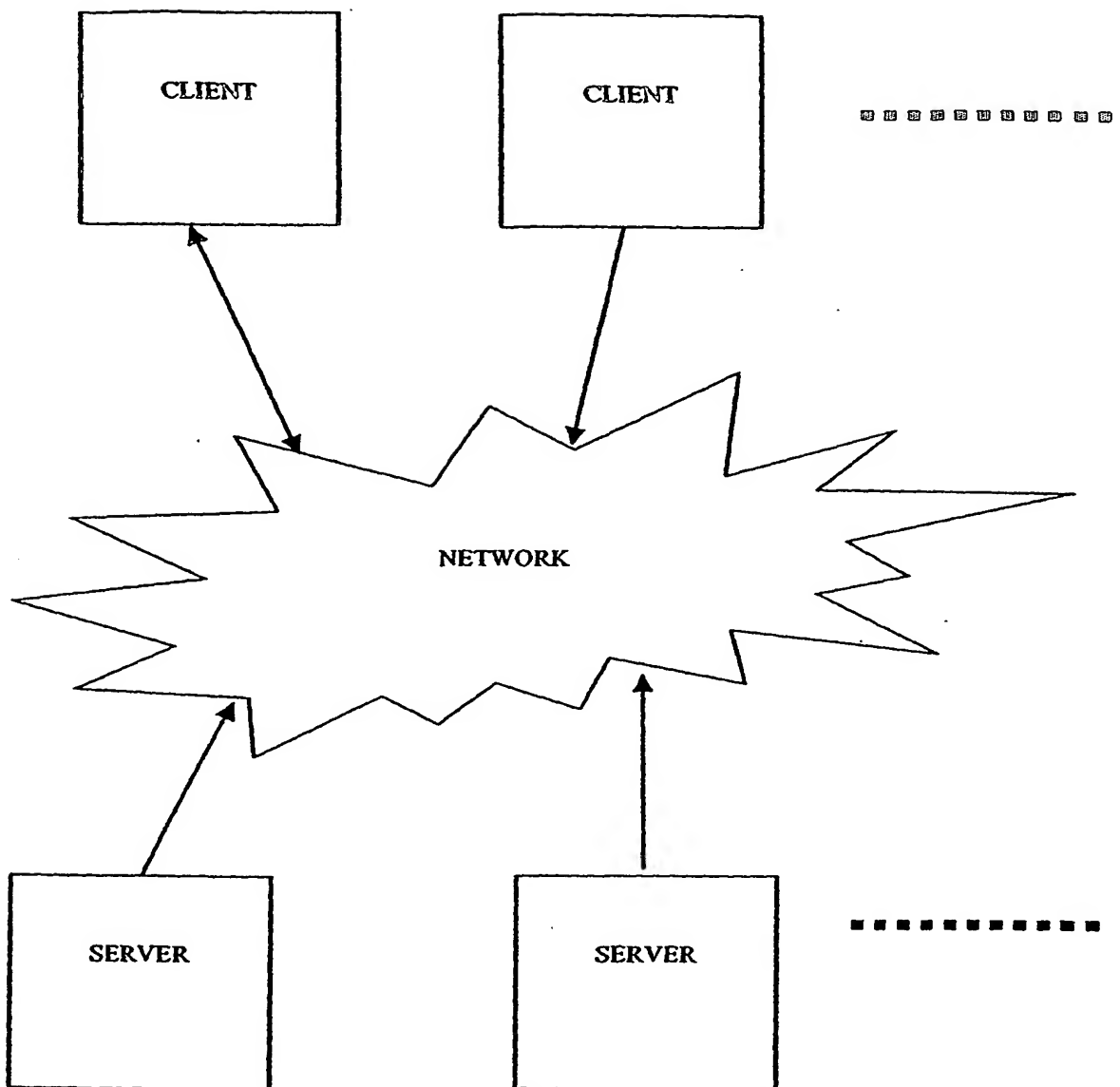


Fig. 1B

QD Data Structure

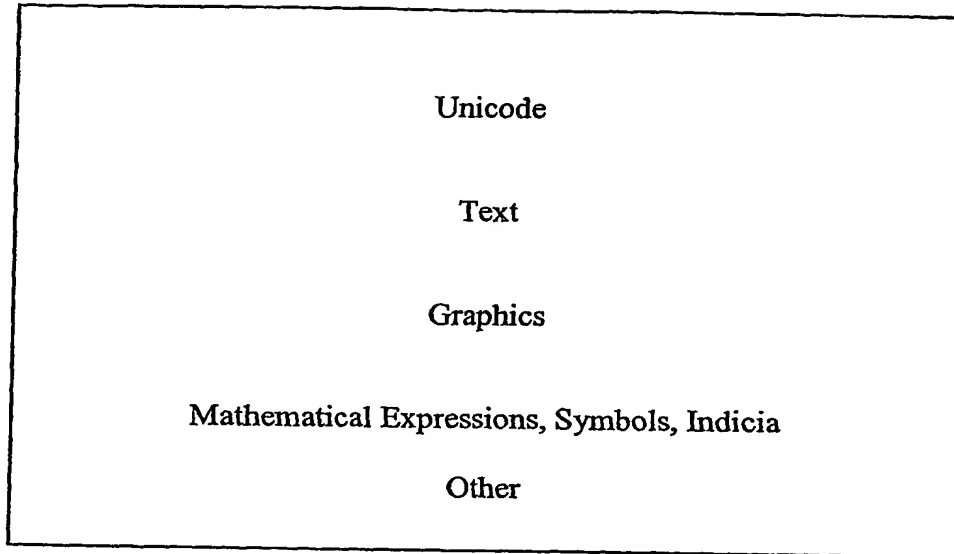


FIG. 2

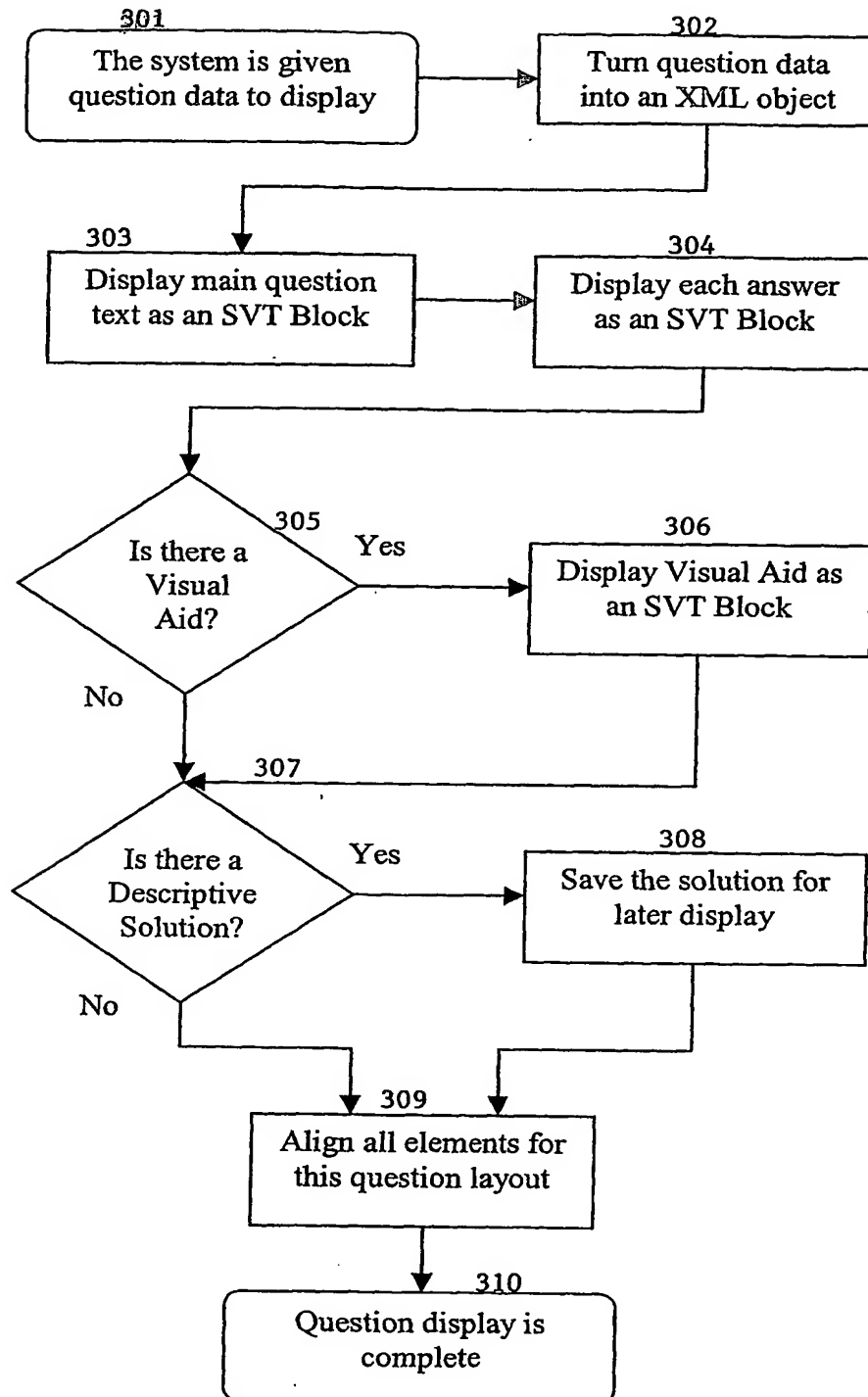
Question Display Flowchart

Fig. 3

Question Display Pseudo-code

```
function parseQuestionXML
    convert raw text to an XML tree
    get question layout style from XML
end parseQuestionXML function

function buildQuestionObjects
    // Sort through branches of question XML.
    for each branch
        if the branch is the main question text
            create a movieclip to contain the text
            call the displaySVTBlock function
        else if the branch is the answer options
            create a movieclip to hold the answers
            for each answer
                create a movieclip to hold the answer
                attach an answer button
                create a movieclip to hold the answer text
                call the displaySVTBlock function
            end for
        else if the branch is some other content block
            if the type of content is visual aid
                if this layout calls for a visual aid
                    create a movieclip to contain the visual aid
                    call the displaySVTBlock function
                else if the type of content is descriptive solution
                    save the contents for possible later display
                end if
            end if
        end for
    end buildQuestionObjects function

function layoutQuestion
    // Positions are based on the question layout style.
    position the main question text
    position the answer block
    position the answers within the answer block
    position the visual aid, if required
    position any other content block
end layoutQuestion function
```

Fig. 4

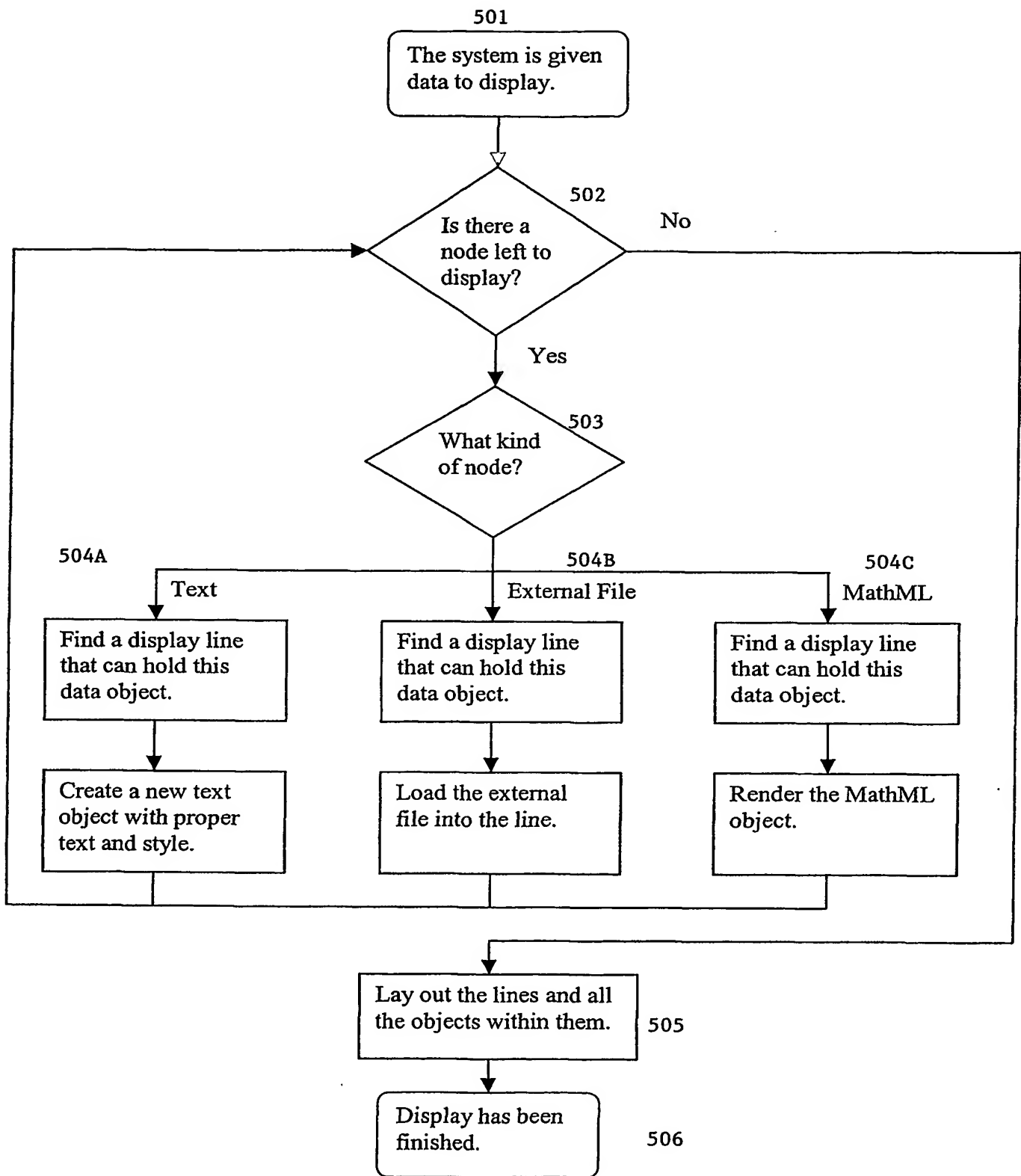
SVT Display Flowchart

Fig. 5

SVT Display Pseudo-code

```

// The displayContentBlock function is the interface to other
// code.
// External code would call this function, specifying the xml
// data to
// display, the destination to display into, and any non-default
// configuration options.

function displaySVTBlock
    // Initialize the environment of the destination,
    based on // configuration options.
    set the environment's width
    set a default text style

    for each node in the XML data
        if node is text
            call the displayText function
        reference else if node is a visual aid file
            call the loadFile function
        else if node is MathML
            call the displayMath function
        end if
    end for

    for each line that has been created in destination
        for each object in line
            gather measurements
        end for
        compute shared baseline and boundaries of
    line for each object in line
        position the object so
    baselines are aligned end for
    align line to other lines and destination
    end for
end displaySVTBlock

function displayText
    inherit the default text style
    modify the style as specified for this node
    create an object to hold text within the current line

    while there is text in the node
        remove a word of text
        add the word to the current line of
    destination if current line has exceeded length
        remove the last line
        mark the line done
        create a new current line
        create an object to hold text
    within the current line add the word to the current
    line
    end while end if
end renderText

function loadFile
    extract file information from node
    create an object of the file's given dimensions
    begin loading the file

    if the object fits in the current line of destination
        place the object into the line
    else
        create a new line
        if the object doesn't fit into the new
    empty line scale the object to fit the
    line
    end if
    place the object into the line
    end if
end loadFile

function displayMath
    create an object to render the math node into
    extract MathML data from node
    call the renderMath function

    if the object fits in the current line of destination
        place the object into the line
    else
        create a new line
        if the object doesn't fit into the new
    empty line scale the object to fit the
    line
    end if
    place the object into the line
    end if
end displayMath

// This function is called recursively -- that is, it calls
// itself.
// MathML objects are frequently composed of other MathML
// objects,
// such as fractions of fractions, so this recursion is
// necessary.
// Nodes in the MathML are of two major types: composite or
// terminal.
// Composite nodes contain other nodes, while terminal nodes
// contain
// only values, such as a number, variable, or mathematical
// symbol.
// For instance, a fraction node would have two child nodes, the
// numerator and denominator. Each child is rendered separately,
// then
// the first is placed over the other, and a line is drawn
// between
// them.

function renderMath
    if the current node is a composite node
        call the renderMath function on each
    child node
    else if the current node is a terminal node
        layout the child node based on node type
        if the node contains text
            create a text box of the
        appropriate style
        else if the node contains an encoded
    symbol insert the graphic for that
    symbol
    end if
    end if
end renderMath

```

Fig. 6

PLAYETII		Process		Sample Question Text		Multiple Choice Answers				Answer	
Index	Subtopic Code	Problem	Stem	a	b	c	d	e			
70	02N02C	90	354 = ____ tens and 4 ones	5	35	354	30	50	b		
71	02N02C	95	There were 85 people in the park. 37 of them were male. How many of them were female?	52 females	42 females	48 females	58 females	122 females	c		<p>WHAT DO WE KNOW? There are 85 people in the park. 37 of them are male.</p> <p>HOW DO WE GET THE ANSWER? The total (85 - 37) are females.</p> <p>WHAT'S THE ANSWER? There are 48 females.</p>
72	02N02C	95	Mrs. Kim sold 25 eggs this morning. She sold another 50 eggs in the afternoon. She still has 18 eggs left. How many eggs did she have to begin with?	83 eggs	75 eggs	25 eggs	68 eggs	7 eggs	a		<p>WHAT DO WE KNOW? Mrs. Kim sold 25 eggs in the morning and 50 in the afternoon. She still has 18 left.</p> <p>HOW DO WE GET THE ANSWER? In total, she sold 75 eggs (25 + 50). Since she still has 18 eggs left, she must have had (75 + 18) eggs to start the day.</p> <p>WHAT'S THE ANSWER? She began the day with 93 eggs.</p>
73	02N02C	95	854 + 354 = ____	1,208	1,108	1,158	500	208	a		
74	02N02C	100	5 twos = ____	5 + 5	2 + 2	2 + 2 + 2	55	22	c		<p>See Figure 6: 5 boxes with 2 simple shapes in each box (5 twos)</p>
75	02N02C	100	4 threes = ____	4	8	12	6	0	c		<p>See Figure 5: 4 boxes with 3 simple shapes in each box (4 threes)</p>
76	02N02C	100	Grace is 30 years younger than her father. Her brother is 1 year older than Grace. Grace's father is 67 years old. How old is Grace's brother?	68 years old	27 years old	29 years old	26 years old	28 years old	e		<p>WHAT DO WE KNOW? Grace's father is 67 years old. Grace is 30 years younger than her father. And her brother is 1 year older than she.</p> <p>HOW DO WE GET THE ANSWER? Grace is (67 - 30) years old. She is 37 years old. Grace's brother is (37 + 1) years old.</p> <p>WHAT'S THE ANSWER? Grace's brother is 38 years old.</p>

Fig. 7